The Institution of Engineers, Australia: Sydney Division
Engineering Heritage Committee

Oral History Program: Biographical Notes

Keith Frederick ALDER AM (1921 -)

Metallurgist and Atomic Physicist

Birth & Family: Born 1921, Moreland, Melbourne; Father plumber/gasfitter; Married, 3 sons.

Education: Mont Albert Central School; Box Hill Grammar School (1 year); Scotch College; University of Melbourne

Qualifications: B.Sc. 1942 University of Melbourne; 1944 Master of Science in Metallurgy.

Memberships: FIEAust.; Fellow, Australian Academy of Technical Sciences and Engineering; Fellow, Institution of Radio and Electronic Engineers, and a Chartered Electronic Engineer; Member, Australasian Institution of Mining and Metallurgy (50+ years).

Awards: Member, Order of Australia (AM), 1983

Work History: Alder worked for a short time for H B Selby & Co. selling scientific equipment before commencing University. After a short stint in the Army in 1941 Alder completed his degree and remained at the University where he was one of a team of five involved in the process of making tungsten and molybdenum for the Radar Valve Program, which included building the entire plant from scratch. He was sent to Newcastle briefly to make gun barrel steel on an open hearth furnace for Commonwealth Steel – this had never been done before. The rest of the war was spent making tungsten and molybdenum rod wire and sheet from Australian ores.

At the end of the war, the plant was transferred to an ammunition factory at Footscray, and Alder went with it as Plant Metallurgist. He stayed for a year by which time it became evident the plant would have to close because of overseas competition.

In 1946 Alder accepted an offer to become a Lecturer in Metallurgy at Newcastle Technical College (the only fulltime lecturer in the State) where he remained until 1948 during which time he faced strong opposition when he replaced a very outdated syllabus.

At the end of 1948 Alder applied for leave of absence to travel to England where he obtained a position with the British Ministry of Supply at the Armoured Research Establishment at Woolwich Arsenal, initially doing research on metallic beryllium in preparation for Operation Hurricane, Britain's first nuclear explosive; he later worked on grain refining zinc with electronic devices. Other projects included being involved in induction melting casting of uranium, and in the design of the line for handling plutonium.

Alder and his wife returned to Australia in 1950 and he resumed lecturing in Newcastle. In 1952 he was asked to return to the University in Melbourne to take up the role of Senior Lecturer in Physical

Metallurgy. He originally began research on ultrasonics, and later built a 25 kilowatt high frequency induction heater.

Desirous of a change from lecturing and preferring to work with tungsten and beryllium, Alder applied for a position as Metallurgist with the newly-formed Australian Atomic Energy Commission (AAEC), his previous experience in nuclear materials giving him a great advantage. In late 1953 he was appointed Senior Research Officer and was sent to England for training at Harwell where he worked initially in the Reactor Fuels Section of the Metallurgy Division, before attending a training course at Reactor School in reactor technology; later he worked on fuel element research for water-cooled reactors.

While at Harwell Alder developed a high frequency heating method for treating the uranium fuel bars for the British nuclear power stations. While at the time he received little credit for this work, he now derives great personal satisfaction from the fact that this method is still being used. He also worked on high frequency induction heating during and after the war. In 1955 Alder was appointed Head of the Metallurgy Section and was then involved mainly in the planning and equipping of the Australian Lucas Heights research establishment.

Alder and his family returned to Australia at the end of 1957 where he commenced work at Lucas Heights on the research and development of beryllium moderation (?); in 1960 he was appointed Deputy Director. In 1961 he took part in a proposal that a small program be commenced to research gas centrifuge as a machine to enrich uranium. This was rejected by the Commission at the time, but later in 1965 it was agreed to start an enrichment project. Later in 1962 when he became Director one of his first initiatives was to re-organise the establishment into a divisional structure.

From 1965 to 1983 Alder was heavily involved in seeking to establish uranium conversion and enrichment industries in Australia (he had become Commissioner of the Australian Atomic Energy Commission in 1968). From 1966-67 to 1970 the Commission began working on the possible fuel and heat removal problems of water-cooled reactors.

Alder's length of appointment as Commissioner was terminated because he successfully opposed the Minister (Rex Conner) who wanted to sell the stockpile of uranium held by the Commission. Alder obtained a legal opinion in his (Alder's) favour which stated that the uranium belonged to the Commonwealth, not the Commission. Alder was re-appointed as Commissioner in 1976.

After retirement, Alder was asked to carry out consulting work for UEGA (Uranium Enrichment Group of Australia) and led their technical assessment of uranium enrichment technology. To his disappointment, yet another positive proposal to build a uranium enrichment plant in Australia was defeated by a change of government – a situation which had happened twice before.

Prepared by Jill Willis, April 2006 from oral history interview conducted on 22.11.1995.